



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/629,307 | 07/29/2003 | Toshiaki Yoshihara | 1100.68223 | 6440 |

24978 7590 05/04/2005

GREER, BURNS & CRAIN
300 S WACKER DR
25TH FLOOR
CHICAGO, IL 60606

EXAMINER

SCHECHTER, ANDREW M

ART UNIT PAPER NUMBER

2871

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/629,307

Applicant(s)

YOSHIHARA ET AL.

Examiner

Andrew Schechter

Art Unit

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 11 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7 February 2005 have been fully considered but they are not persuasive.

The applicants argue the recited electric field strength of more than 4 V/ μ m is applied to the liquid crystal, and the cited reference *Hasegawa* only discloses the voltage (0.2V to 10V) applied to the liquid crystal and the alignment layers; *Hasegawa* is therefore (they argue) silent on the electric field strength applied to the liquid crystal layer by itself.

This is not persuasive. First, claim 1 does not recite that the electric field strength is specific to the liquid crystal; this limitation is found only in the amended claim 8. Second, the liquid crystal thickness in *Hasegawa* is disclosed as 2 μ m, a typical thickness of a polyimide alignment layer is, say, 0.1 μ m, and the dielectric constants for liquid crystal and polyimide are on the same order of magnitude; this means that the difference between the electric field strength applied to the cell and the electric field strength applied to the liquid crystal is essentially negligible. *Hasegawa's* 0.2V to 10V is effectively equal to the voltage applied to the liquid crystal, and gives an electric field strength of 0.1 V/ μ m to 5 V/ μ m.

The applicants argue that *Jones* differs from the present invention in having an AC drive rather than a DC drive, or in not having switching elements. This is not persuasive, as the examiner does not see where such limitations are recited in claims 1-

Art Unit: 2871

6. The applicants argue that *Jones* differs from the present invention in having an bistable LCD rather than a monostable LCD. This is not persuasive. First, *Jones* explicitly refers to bistability only in the context of describing prior art devices [col. 1, line 25], and only in the context of bistable devices as opposed to bistable states. Second, *Jones* teaches that the purpose of the invention is to force the liquid crystal molecules to go into the C2 state rather than C1 state [see abstract, etc.], with a very large energy difference between the two states. The C2 state is therefore energetically dominant over the C1 state, so the C2 state is a monostable state, as recited by the claims, rather than a bistable state.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 12 recites that the control voltage for turning on the switching elements is zero. To the examiner, it appears that a zero voltage causes any standard switching element (such as a TFT, for example) to turn off, rather than on. Applying zero voltages to such a switching element would cause the pixel potential to float, so that the desired

Art Unit: 2871

electric field would not be applied to the liquid crystal. Therefore, the specification does not enable one skilled in the art to make and/or use the claimed invention. Clarification on this question by the applicant would be appreciated.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 recites that the potential of the control voltage and the DC voltage is zero. In the Remarks section, on p. 8, that applicant states that this was intended to state that the "difference in potential", rather than the "potential", is zero. If this amendment were made in the claims, the rejection under 35 U.S.C. 112, first paragraph, would be overcome. However, the claim would not be further limiting of the independent claim 10, which already recites that the these voltages are at equal potential, which means that the difference in potential is zero. The claim would therefore be objected to as not further limiting.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-3, 8, and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by *Hasegawa et al.*, U.S. Patent No. 6,614,491.

Hasegawa discloses [see Figs. 1-3, for instance] a manufacturing method of a liquid crystal display device comprising two substrates [11, 31] sandwiching a liquid crystal [40] having spontaneous polarization; and electrodes [15, 34, etc.] formed on the substrates for applying a voltage to the liquid crystal, the liquid crystal showing a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction when no voltage is applied [col. 5, lines 53-55, etc.]; said method comprising the steps of heating the liquid crystal [col. 5, lines 43-44, etc.]; and applying an electric field with electric field strength of more than 4 V/ μ m in a vicinity of a transition temperature from a higher temperature phase than chiral smectic C phase to the chiral smectic C phase in an alignment treatment which is performed to obtain the monostable state after heating [col. 5, lines 43-55; the cell gap and liquid crystal thickness is 2 μ m, col. 9, line 39, and Fig. 3 shows 7-10 V being applied, so the electric field is 3.5-5 V/ μ m]. Claim 1 is therefore anticipated.

The 5 V/ μ m disclosed by *Hasegawa* is within the range equal to or more than 5 V/ μ m recited in claim 2, so claim 2 is also anticipated. A temperature range of the

vicinity of the transition temperature includes a temperature range of $\pm 2^{\circ}\text{C}$ from the transition temperature, so claim 3 is also anticipated.

Considering the additional limitations of claim 8, *Hasegawa* also discloses a pixel substrate [11] with pixel electrodes [15], a common substrate [31] with common electrode [34], data lines [16], switching elements [18], scanning lines [12], and applying a control voltage [-20V, for instance] for controlling the state of said switching elements to said scanning lines and applying a different DC voltage [see Fig. 3] to said data lines and said common electrodes in a vicinity of a transition temperature as recited; and the electric field strength applied to the liquid crystal by the voltage difference between the data lines and common electrodes is more than $4\text{ V}/\mu\text{m}$, as discussed above under *Response to Arguments*. Claim 8 is therefore anticipated as well.

The $5\text{ V}/\mu\text{m}$ disclosed by *Hasegawa* is within the range equal to or more than $5\text{ V}/\mu\text{m}$ recited in claim 9, so claim 9 is also anticipated.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Hasegawa et al.*, U.S. Patent No. 6,614,491 as applied to claim 1 above, in view of *Miura et al.*, U.S. Patent No. 6,703,993.

Hasegawa does not disclose necessarily disclose a backlight driven by a field-sequential color scheme, with data-writing and data-erasure scanning voltages. *Miura* does disclose [see Fig. 8 and discussion thereof, etc.] a backlight driven by a field-sequential color scheme, with data-writing and data-erasure scanning voltages. It would have been obvious to one of ordinary skill in the art at the time of the invention to use these in the method of *Hasegawa*, motivated by the desire for a high resolution display and *Miura's* teaching that doing so allows a full-color image to be effectively displayed without undesired influence from the preceding frame period, thus improving the display image qualities [see col. 6, lines 34-60, for instance]. Claim 7 is therefore unpatentable.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Hasegawa et al.*, U.S. Patent No. 6,614,491 as applied to claim 1 above, in view of *Wingen et al.*, U.S. Patent No. 6,605,323.

Hasegawa discloses [col. 9, lines 13-15] a liquid crystal with a phase sequence (from high to low temperature) of isotropic liquid phase – nematic phase – chiral smectic C phase, or I–N–smectic C*, where (*) indicates chiral. Claim 4 recites either I–N*–smectic C* or I–N*–smectic A–smectic C*. (Note that chiral nematic and cholesteric are both N*, being interchangeable terms for this purpose.) *Hasegawa* therefore discloses a different phase sequence than those recited, in particular disclosing N rather than N*.

Wingen discloses an analogous LCD with liquid crystal having spontaneous polarization, and discloses that the phase sequence preferably comprises “isotropic – nematic or cholesteric (N*) – smectic C*” [col. 4, line 45]. This is evidence that the liquid

Art Unit: 2871

crystals with the sequence I–N–smectic C* are art recognized equivalents to those with the sequence I–N*–smectic C*. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a liquid crystal with phase sequence I–N*–smectic C* rather than I–N–smectic C* in *Hasegawa's* method, motivated by the art-recognized equivalency of the two. Claim 4 is therefore unpatentable.

11. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Jones*, U.S. Patent No. 6,307,610 in view of *Jones*, U.S. Patent No. 6,307,610.

Jones discloses [see Fig. 2, etc.] a manufacturing method of a liquid crystal display device comprising two substrates sandwiching a liquid crystal having spontaneous polarization; and electrodes [5, 6], formed on the substrates, for applying a voltage to the liquid crystal, the liquid crystal showing a monostable state in which an average molecular axis of a director of liquid crystal molecules is aligned in a single direction when no voltage is applied, said method comprising the steps of: heating the liquid crystal [col. 5, line 64ff.]; and applying an electric field in a vicinity of a transition temperature from a higher temperature phase than chiral smectic C phase to the chiral smectic C phase in an alignment treatment which is performed to obtain the monostable state after heating [col. 6, lines 1-8, abstract, etc.].

Jones does not explicitly disclose the remaining limitation of claim 1, that the electric field strength is more than 4 V/ μm . *Jones* discloses using an AC voltage typically between 0.5 V and 5.0 V [col. 6, line 5] and a liquid crystal thickness about 1-6 μm [col. 4, line 66], which corresponds to a range of electric field strengths from about 0.1 V/ μm to about 5 V/ μm . This range overlaps the recited range; in such case a *prima*

facie case of obviousness exists [see MPEP 2144.05]. Furthermore, *Jones* teaches [col. 10, lines 48-53] that applying 0 V gave 20% of the desired texture, 0.5 V gave 60%, and 2 V gave nearly 100%. This constitutes a teaching that increasing the applied voltage (and hence increasing electric field strength) is desirable in that it tends to produce more of the desired liquid crystal texture. The electric field strength is therefore a result-effective variable whose optimization would have been obvious to one of ordinary skill in the art at the time of the invention; it would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use an electric field strength in the method of *Jones* which is more than 4 V/ μm . Claim 1 is therefore unpatentable.

Similarly, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an electric field strength equal to or more than 5 V/ μm , so claim 2 is also unpatentable. A temperature range of the vicinity of the transition temperature includes a temperature range of $\pm 2^\circ\text{C}$ from the transition temperature, so claim 3 is also unpatentable. The liquid crystal shows a phase sequence of isotropic – cholesteric – smectic A – chiral smectic C [see col. 1, lines 19-23], so claim 4 is also unpatentable. There are alignment films formed on the two substrates wherein rubbing directions of the alignment films are equal to each other [col. 5, lines 18-31], so claim 5 is also unpatentable. A pretilt angle of the alignment films is not more than 2° [$\xi \sim 1.5^\circ$, col. 10, lines 58-60, etc.], so claim 6 is also unpatentable.

Allowable Subject Matter

12. Claims 10 and 11 are allowed.
13. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the device of claim 10, in particular the additional limitation that the control voltage for turning on the switching elements and the DC voltage are at equal potential. Claim 10 is therefore allowed, along with dependent claim 11.

Conclusion


14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Andrew Schechter
Patent Examiner
Technology Center 2800
27 April 2005


ROBERT H. KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800